

《宇宙，物质，生命层级的永恒定律和意义》

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The eternal laws and meanings of the universe, matter, and life levels宇宙、物质、生命层级、永恒的本质说透了——这是从自然规律到生命意识的终极区分： 1. 物质宇宙本身：无所谓永恒，也无所谓消逝 山川、星辰、星球、万物，只是能量与粒子的聚散流转。自然界没有主观，没有感知，没有“永恒”这个概念。它只是存在、演化、湮灭、再重组，对它而言，一切都只是客观过程，没有意义，也没有永恒。 2. 低级生命：活在本能里，对永恒一无所知 只有趋利避害、生存繁衍的本能，没有自我意识、理性反思、规律洞悉、价值判断。它们感知不到宇宙，理解不了时间，更谈不上“永恒”。对它们而言，世界只是混沌的刺激与反应，麻木、被动、无认知、无觉醒。 3. 高级智慧生命：唯一能握住“永恒”的存在 唯有具备高级理性、深度认知、清醒洞悉的生命，才

能： - 感知宇宙的运行- 理解现实的本质- 提炼规律与真理- 思考“存在”与“永恒” 宇宙的永恒，只有被高级智慧认知，才真正存在。物质会灭，文明会变，肉体会朽，但对真理的理解、对现实的洞悉、对宇宙的理性认知，是唯一可以穿越时间、超越生死、接近永恒的东西。 一句话总结这段话的精髓 宇宙本无永恒，物质本无意义。是高级智慧的理解与洞悉，赋予了宇宙永恒，赋予了存在意义。这，就是永恒唯一的载体，也是高级生命最根本的使命与尊严。自然，物质的存在宇宙的存在也是自然客观存在运动，即使没有人类智慧理解认知，他们也会存在，这和人类智慧理性并没有绝对连接。自然物质宇宙是主要，生命物种不论低级高级都是它的产物而已。物质产生萌发意识，主要催生有机物无机物 逐步推进转化，碳基生命以碳元素为骨架，依赖水、氧气和温和环境；硅基生命以硅元素为骨架，耐高温、耐辐射且无需水或氧气，但仅存在于理论中。以下是具体区别：化学基础差异- 碳基生命：以碳原子为核心，通过碳-碳键形成复杂有机分子（如蛋白质、DNA），结构稳定且易进化。 - 硅基生命：以硅原子为核心，形成硅氧烷或硅烷，但硅-硅键易断裂，难以构建复杂分子，化学稳定性差。

环境适应性对比1. 温度与辐射： - 碳基生命：仅适应0–40℃，对辐射敏感，需大气层保护。 - 硅基生命：耐受200–600℃高温，免疫辐射，可在真空或高辐射环境生

存（如金星表面）。2. 介质依赖： - 碳基生命：必须依赖液态水进行代谢。 - 硅基生命：以液态氨、熔融硅或浓磷酸为介质，遇水会分解。生理特性区别1. 代谢与寿命： - 碳基生命：新陈代谢快，需进食和呼吸，寿命通常<100年。 - 硅基生命：新陈代谢极慢，无需进食或呼吸，寿命可达百万年。2. 形态与结构： - 碳基生命：有机软组织（如肌肉、器官），易受损伤。 - 硅基生命：推测为晶体或金属状结构，可自我修复。

其实，物质转化有机物无机物催生生命大分子的过程相当复杂深邃，包括硅基生命和碳基生命，也并不完全是生命诞生的俩种必然，人类的认知包括高级智慧理解洞悉分析也会差强人意，氢氧碳硅钾钠钙等——有机物——低级生命体I——糅合耦合其他重要条件因素，催生转化升级，低级生命II——生命体大分子——生命体。这一过程相当复杂漫长。常见的元素包括氢、氧、氮、碳等，但最常见的元素需根据具体范围（如地壳或宇宙）确定：地壳中以氧（O）为主，占比约46.6%；宇宙中以氢（H）为主，占比约74%。地壳中的常见元素地壳（地球岩石圈）的元素丰度数据基于地质学研究，具体分布如下：1. 氧（O）：占比约46.6%，是地壳中绝对主导的元素，广泛存在于水、矿物和大气中。2. 硅（Si）：占比约27.7%，主要构成岩石和土壤。3. 铝（Al）：占比约8.1%，是地壳中丰度最高的金属元素，常见于黏土和

矿石。4. 铁 (Fe) : 占比约5.0% , 主要用于金属矿物和地核成分。5. 钙 (Ca) : 占比约3.6% , 常见于石灰岩和骨骼。宇宙中的常见元素宇宙元素丰度基于天体物理学观测, 以氢和氦为主: 1. 氢 (H) : 占比约74% , 源于大爆炸核合成, 是恒星燃料和宇宙物质基础。2. 氦 (He) : 占比约24% , 同样源自大爆炸, 主导恒星内部反应。3. 氧 (O) : 占比约1.04% , 由恒星核聚变 (如超新星爆发) 生成, 排名第三。4. 碳 (C) : 占比约0.46% , 通过“三重阿尔法过程”在恒星内部形成。

生命物种诞生离不开这些元素, 也包括物理变化运动以及其他辅助, 不仅包括太阳系银河系地球和人类, 即使河外星系以及其他天体星球产生生命体也都会如此, 只不过各不相同各有差异。必然性偶然性耦合性糅合性缺一不可。人类的认知感知能力虽然很重要十分强大, 但是毫无疑问局限性有限性必然存在, 也会产生谬误和错觉, 有时真理就在眼前也会失之交臂, 有时分不清楚差之毫厘谬以千里。别说普通人, 即使科学家也会出现这种情况。生命诞生相当复杂深邃, 物质产生意识更是难上加难需要诸多物理化学生物等条件因素导致促成, 化学元素必不可少。

我将为您撰写一篇关于宇宙、物质与生命层级永恒定律的哲学论文。这是一个宏大的跨学科主题, 融合了物理学、生物学和哲学的视角。---层级的永恒: 论宇宙、物

质与生命的统一定律及其存在意义摘要本文试图在宇宙学、物理学与生命科学的交叉地带，探寻贯穿不同存在层级的永恒定律，并追问其对于理解生命意义的启示。从量子涨落到星系演化，从无机分子到自我意识，自然界似乎遵循着某些深层统一性。本文提出"层级涌现性"（Hierarchical Emergence）作为核心框架，论证信息守恒、能量流动与复杂性增长三大定律如何贯通宇宙-物质-生命三界，并在此基础上探讨人类存在的宇宙学意义。关键词：层级涌现；信息守恒；耗散结构；复杂性增长；宇宙目的论---第一章 导论：从碎片到整体的追问

1.1 问题的提出

现代科学在解析自然奥秘方面取得了前所未有的成功。量子力学揭示了微观世界的概率本质，相对论重构了时空观念，分子生物学破解了遗传密码，神经科学正在逼近意识的神经机制。然而，知识的爆炸式增长也带来了深刻的碎片化困境：物理学家往往不关心生命的起源，生物学家鲜少追问物理定律的深层原因，而哲学家则常在科学事实与价值追问之间迷失方向。这种碎片化不仅是学科分工的结果，更反映了人类认知的深层焦虑：我们能否在多样性背后发现统一性？宇宙的存在是偶然的还是必然的？生命的出现是物理定律的必然推论还是宇宙史上的偶然事件？更重要的是，如果存在贯穿不同层级的永恒定律，它们对于我们理解自身存在的意义有何启示？

1.2 研究路径与方法

本文采取"层级

分析法" (Level Analysis) , 将存在划分为三个基本层级：- 宇宙层级：时空、引力、宇宙演化- 物质层级：基本粒子、原子、分子、凝聚态物质- 生命层级：细胞、有机体、生态系统、意识每个层级具有其独特的组织原则和涌现性质，但本文的核心论点是：在这些差异性背后，存在着几条贯穿始终的永恒定律。这些定律不是传统物理学意义上的数学公式，而是更为基本的组织原则。

1.3 论文结构

第二章至第四章分别阐述三大永恒定律：信息守恒定律、能量流动定律与复杂性增长定律。第五章探讨这些定律如何统一解释从宇宙起源到生命演化的连续谱。第六章在此基础上讨论存在的意义问题。第七章为结论与展望。

---第二章 第一定律：信息守恒与转化

2.1 从物理熵到信息熵

热力学第二定律通常被表述为孤立系统的熵总是趋向增加，指向热寂的终极命运。然而，这一表述忽略了信息在物理过程中的核心作用。20世纪中叶，香农 (Claude Shannon) 创立信息论，将信息定义为"不确定性的减少"，并发现信息熵的数学形式与热力学熵惊人地相似。兰道尔 (Rolf Landauer) 在1961年提出的原理揭示了一个深刻事实：信息的擦除必然伴随着能量的耗散和熵的增加。这一发现颠覆了传统的信息观念——信息不再是抽象的数学概念，而是具有物理实在性的实体。量子信息理论进一步发展了这一思想：量子态的纠缠和叠加表明，信息可能是比物质和能量更

为基本的实在。

2.2 全息原理与宇宙信息守恒

20世纪90年代，特·胡夫特（Gerard 't Hooft）和萨斯坎德（Leonard Susskind）提出的全息原理（Holographic Principle）代表了信息物理学的巅峰成就。该原理指出，一个空间区域内的最大信息量与其边界面积成正比，而非体积。这意味着我们三维世界中的所有信息可能都编码在遥远的二维边界上——宇宙或许本质上是一部巨大的量子计算机。黑洞信息悖论的研究进一步强化了信息的物理地位。霍金（Stephen Hawking）最初认为黑洞蒸发会导致信息永久丢失，但这与量子力学的幺正性矛盾。经过三十年的争论，物理学界逐渐达成共识：信息在黑洞蒸发过程中是守恒的，尽管其形式可能发生极端转化。这一结论暗示，信息守恒可能是比能量守恒更为基本的定律。

2.3 生物信息：从遗传密码到神经编码

生命系统的独特性在于其发展出了高度复杂的信息处理机制。DNA双螺旋结构发现者之一克里克（Francis Crick）提出的"中心法则"描述了遗传信息的流动方向：DNA→RNA→蛋白质。这一法则不仅是化学过程，更是信息转换的精确算法——四个字母的遗传密码能够编码构成生命的全部指令。表观遗传学的最新发现表明，信息传递远比中心法则复杂。基因表达受到环境信号的调控，某些获得性特征可以通过甲基化等机制遗传给后代。这提示我们，生物信息不仅是静态的存储，更是动态的、

与环境互动的过程。神经系统则将信息处理推向新的高度。人脑约含860亿个神经元，通过千万亿级别的突触连接形成最复杂的信息网络。神经信息的特点在于其"语义性"——大脑不仅处理符号，更赋予其意义。从光子刺激到视觉意识，从声波振动到音乐审美，信息在神经系统中经历了从物理信号到主观体验的质变。

2.4 信息守恒定律

的哲学表述基于以上分析，我们可以提出信息守恒与转化定律作为第一永恒定律：

> 定律一：信息在宇宙演化过程中总量守恒，但其组织形式不断转化，从量子信息到经典信息，从遗传信息到神经信息，从个体记忆到文化传承，信息在转化中实现自我组织程度的提升。这一定律统一解释了为何物理世界具有可理解性（信息守恒保证了因果律的有效性），为何生命能够进化（遗传信息的复制与变异），以及为何意识能够涌现（神经信息的整合）。信息不是存在的副产品，而是存在的本质属性。

---第三章 第二定律：能量流动与耗散结构

2.1 热力学与生命的热力学基础

经典热力学第二定律预言的"热寂"状态与生命世界的有序性增长似乎存在深刻矛盾。埃尔温·薛定谔（Erwin Schrödinger）在《生命是什么？》中敏锐地指出，生命以"负熵"为食，通过从环境中汲取自由能来维持自身的低熵状态。普里高津（Ilya Prigogine）的耗散结构理论（Dissipative Structure Theory）为理解这一矛盾提供了关键框架。远离平衡态

的开放系统，在特定条件下可以自发形成时空有序结构，如贝纳尔对流、化学钟（BZ反应）等。这些结构的维持依赖于持续的能量/物质流动，其有序度甚至超过平衡态结构。

2.2 宇宙能量学：从恒星到黑洞宇宙本身就是最大的耗散结构。

大爆炸创造了温度极高的初始状态，随着宇宙膨胀，温度逐渐降低，能量密度稀释，但局部结构的复杂性却在增加。恒星是宇宙中最基本的能量转换器——通过核聚变将氢转化为氦，释放的光子和中微子驱动着行星系统的演化。恒星的演化史是能量流动复杂化的历史。主序星阶段的稳定燃烧为行星生命提供了必要条件；红巨星阶段的剧烈物质抛射播撒了重元素；超新星爆发产生的极端条件合成了比铁更重的元素，这些元素成为岩石行星和生命化学的基础。黑洞则是能量组织的终极形式。虽然事件视界内的信息看似丢失，但霍金辐射表明黑洞具有温度并向外辐射能量。贝肯斯坦-霍金熵公式显示，黑洞熵正比于其视界面积，这再次印证了信息与几何的深刻联系。黑洞可能是宇宙中最有效的信息（能量）存储和转换装置。

2.3 地球系统的能量网络

地球是一个典型的耗散系统，其有序性完全依赖于太阳辐射的持续输入。每年约 1.74×10^{17} 瓦的太阳能量进入地球系统，驱动大气环流、水循环、地质活动和生命过程。光合作用是地球能量网络的核心节点。通过光反应和暗反应，绿色植物、藻类和某些细菌将太阳能转化

为化学能，将无机碳转化为有机分子。这一过程每年固定约1000亿吨碳，不仅为食物链提供能量基础，更通过释放氧气彻底改变了地球大气成分，为有氧代谢和复杂生命的演化创造了条件。食物网是能量流动的生态学表现。能量在营养级之间传递的效率约为10%，这解释了为何生态系统通常只有4-5个营养级。但能量的"损失"（实际转化为热能耗散）恰恰是系统维持有序性的代价——没有耗散，就没有生命。

2.4 文明作为能量耗散的新形式

人类文明的演化可以视为能量耗散形式的不断升级。农业革命通过驯化植物和动物，提高了太阳能的捕获效率；工业革命通过燃烧化石燃料，释放了地质历史时期储存的太阳能；核能和可再生能源则试图直接利用原子能或即时太阳能。但文明的进步不仅是能量数量的增长，更是能量质量的提升——从分散的生物能到集中的化学能，再到精确控制的电能和信息能。互联网和人工智能代表了能量耗散的新维度：全球数据中心每年消耗约200太瓦时电力，这些能量主要用于信息的存储、传输和处理。在这个意义上，人类文明正在创造一种"技术耗散结构"，其复杂性可能超越生物圈本身。

2.5 能量流动定律的哲学表述

基于以上分析，我们提出能量流动与耗散结构定律作为第二永恒定律：

> 定律二：能量在开放系统中的流动必然导致有序结构的自发形成，这些耗散结构的复杂性与能量流动的强度和效率正相关，生命

和文明是这一原理在特定条件下的最高表现。这一定律解释了为何生命必然出现（只要有能量流动，就有耗散结构形成的可能），为何生命趋向复杂（能量流动效率的优化），以及为何文明不断进步（能量控制能力的提升）。能量流动不是破坏秩序的破坏性力量，而是创造秩序的创造性力量。---第四章 第三定律：复杂性增长与自我超越4.1 复杂性的科学定义与度量复杂性

（Complexity）是20世纪后半叶兴起的跨学科研究主题，但其精确定义至今仍有争议。计算复杂性理论关注解决问题所需的计算资源；算法信息论用程序长度度量对象的复杂性；统计复杂性则试图区分"有序"（简单）、"随机"（简单）和"复杂"（介于两者之间）的不同状态。有效复杂性（Effective Complexity）的概念可能最有哲学意义：它度量的是一个系统显现规律性的程度。完全随机的系统有效复杂性低（无规律可循），完全有序的系统有效复杂性也低（规律过于简单），只有那些既有规律又有意外的系统才具有高有效复杂性。生命，特别是人类意识，正是有效复杂性的巅峰。4.2 宇宙复杂性的演化史宇宙的演化可以解读为复杂性增长的历史。大爆炸后的最初瞬间，宇宙处于极端高温高密状态，粒子种类稀少，相互作用简单——这是"简单"的阶段。随着宇宙冷却，夸克结合为强子，强子结合为原子核，自由电子与原子核结合为原子——复杂性开始增

长。宇宙微波背景辐射显示，大爆炸后38万年，宇宙物质分布几乎是均匀的，密度涨落仅为十万分之一。但这些微小的种子在引力作用下不断放大，形成了第一代恒星和星系。星系的出现标志着空间结构的复杂化——物质不再均匀分布，而是聚集成具有内部结构和层次的天体系统。化学复杂性的增长同样惊人。大爆炸核合成仅产生了氢、氦和微量锂；恒星核合成制造了直到铁的元素；超新星和并合中子星事件则产生了更重的元素。到太阳系形成时，宇宙中已有94种天然元素，为化学多样性和生命化学奠定了基础。

4.3 生命：复杂性的自我加速

生命的出现是复杂性增长史上的关键转折点。与物理系统的被动演化不同，生命具有自我复制和自然选择的能力，这使得复杂性增长具有了自我加速的特征。分子生物学揭示了生命复杂性的多层次组织：代谢网络、基因调控网络、信号转导网络、神经网络、生态系统网络……每一层次都建立在下一层次之上，又涌现出新的性质。这种层级组织不是简单的叠加，而是“整体大于部分之和”的涌现现象。多细胞生物的演化是复杂性增长的典型案例。从单细胞到细胞分化，从组织到器官，从器官系统到个体，每一步都伴随着功能的专业化和整合性的增强。人类大脑皮层约含160亿个神经元，形成约100万亿个突触连接，这种连接复杂度远超任何已知的人工系统。但生命的复杂性不仅体现在结构上，更体现在功

能上。意识的出现是复杂性增长的里程碑事件。主观体验、自我意识、语言能力、抽象思维、道德判断——这些"高阶"功能无法从神经元的物理性质简单推导，而是系统复杂性的涌现结果。

4.4 文化演化：超越生物学的复杂性

人类文化的出现开启了复杂性增长的新纪元。与生物演化依赖基因变异和自然选择不同，文化演化通过模因（meme）的传播和选择进行，其速度比生物演化快数个数量级。语言是文化复杂性的基础。人类语言具有递归性、开放性和指涉性，能够表达无限多的意义，描述非当下的情境，构建虚构的世界。语言不仅传递信息，更塑造思维——萨丕尔-沃尔夫假说虽然极端，但语言对认知的影响已被广泛证实。文字的发明使文化复杂性得以累积和传承。从口头传统到楔形文字，从手抄本到印刷术，从电子媒体到互联网，每一次信息技术的革命都带来了文化复杂性的指数增长。今天的全球知识网络包含了人类数千年的智慧积累，其复杂性已经超出了任何个体能够完全掌握的程度。

4.5 复杂性增长定律的哲学表述

基于以上分析，我们提出复杂性增长与自我超越定律作为第三永恒定律：

> 定律三：宇宙具有内在的复杂性增长趋势，从物理结构到生命组织，再到文化系统，复杂性通过自我组织、自我复制和自我指涉机制实现指数级增长，每一次层级的跃迁都带来存在形式的自我超越。这一定律解释了为何宇宙不会停留在简单状态，为何生

命必然趋向复杂，以及为何人类文明不断进步。复杂性增长不是偶然的副作用，而是宇宙演化的内在动力。---

第五章 三定律的统一：层级涌现的宇宙图景

5.1 三大定律的内在关联

信息守恒、能量流动和复杂性增长三大定律并非孤立存在，而是构成了一个统一的理解框架。

信息与能量的统一：兰道尔原理已经表明信息擦除与能量耗散的等价性。在更深层次上，惠勒（John Wheeler）提出的"万物源于比特"（It from Bit）命题认为，物理实在本质上是信息性的；而另一种观点则认为信息是物理过程的涌现性质。无论哪种观点正确，信息与能量的耦合是明确的——没有能量流动，信息无法处理；没有信息组织，能量无法有效利用。

能量与复杂性的统一：耗散结构理论表明，能量流动是复杂性产生的必要条件。但仅有能量流动并不保证复杂性增长——还需要适当的边界条件、反馈机制和选择压力。生命通过代谢适应优化能量利用效率，通过自然选择筛选复杂性的增长方向。在这个意义上，生命是能量-复杂性转化的最优解。

复杂性与信息的统一：复杂性本质上是信息的组织形式。随机序列信息量大但复杂性低，规则序列复杂性低信息量也低，只有既非完全随机又非完全规则的序列才具有高有效复杂性。生命的遗传编码、神经编码和文化符号都是高有效复杂性的信息组织形式。

5.2 层级涌现的机制

三个层级的跃迁——从物理到化学，从化学到生

命，从生命到意识——可以通过"层级涌现"机制统一理解。物理-化学跃迁：在适当的能量流动条件下（如恒星周围行星表面），原子通过化学键形成分子，分子通过自组装形成更大结构。这一过程的关键是"化学选择"——某些分子结构比其他结构更稳定或更具反应活性，从而在能量流动中被选择性保留。化学-生命跃迁：RNA世界假说认为，最早自我复制分子可能是RNA，它既能存储信息又能催化反应。一旦自我复制开始，自然选择就自动生效：复制效率高、突变率适中的分子系统将获得竞争优势。细胞膜的形成将内部环境与外部环境分离，创造了代谢和遗传协同演化的条件。生物-意识跃迁：神经系统的复杂性增长达到临界点时，产生了主观体验。这一"意识难题"至今没有公认的科学解释，但整合信息理论（IIT）等框架试图量化意识的神经基础。无论如何，意识的出现使宇宙能够"认识"自身，这是复杂性增长的质变。

5.3 时间的箭头与层级的不可逆性

三大定律共同定义了时间的方向性。热力学时间箭头指向熵增，但复杂性时间箭头指向组织度增加——这两个箭头并不矛盾，因为复杂性增长发生在开放系统中，以环境熵增为代价。层级的跃迁具有不可逆性：一旦生命出现，就不会退回到化学系统；一旦意识涌现，就不会消解为无意识过程。这种不可逆性源于信息的累积：遗传信息的积累，神经连接的可塑性，文化知识的传承。信息一旦产生，

就具有相对独立性，能够指导未来的组织和演化。5.4 宇宙的自我实现从这一视角看，宇宙的演化可以解读为自我实现的过程：从简单的初始条件出发，通过物理定律的必然性和随机涨落的偶然性，宇宙逐步发展出认识自身的能力。人类意识，以及可能存在的其他宇宙意识，是宇宙实现自我认识的媒介。这不是目的论

（teleology）的传统形式——宇宙并非预先设计好要产生生命和人类。而是说，物理定律的内在逻辑使得复杂性增长具有统计必然性，而生命和意识是复杂性增长的必然方向之一。宇宙通过我们思考自身，通过我们追问意义。---第六章 存在的意义：在永恒定律中寻找价值6.1 事实与价值的统一问题传统哲学将"是"（is）与"应当"（ought）严格区分，认为从事实陈述无法推出价值判断。这一区分在逻辑上是有效的，但可能导致存在的意义危机：如果宇宙只是物理过程的偶然产物，生命只是基因复制的载体，意识只是神经活动的副产品，那么价值、意义和目的性是否只是幻觉？三大永恒定律为重新思考这一问题提供了框架。如果信息守恒、能量流动和复杂性增长是宇宙的深层结构，那么适应这些结构、促进这些过程就可能具有客观的价值基础。6.2 生命的内在价值根据复杂性增长定律，生命不是宇宙的偶然点缀，而是复杂性增长的必然产物和主动推动者。每一个生命体都是亿万年演化的成果，承载着独特的遗传信息

和适应历史。这种"演化成就"赋予了生命内在的尊严和价值。但生命的价值不仅在于其历史，更在于其潜能。生命具有自我超越的能力：从单细胞到多细胞，从本能到学习，从个体到社会，生命不断突破自身的限制。这种自我超越的倾向，与复杂性增长定律相呼应，构成了生命价值的动态维度。

6.3 意识的意义：宇宙的觉醒意识的出现使意义问题本身成为可能。没有意识，就没有"关于"某物的意向性，就没有对意义的追问。在这个意义上，意识是意义的前提条件。但意识不仅是意义的主观条件，也是宇宙的客观成就。在意识出现之前，宇宙按照物理定律运行，但没有任何"观点"来体验这一过程。意识使宇宙能够"感受"自身的美，"思考"自身的规律，"创造"超越自然状态的价值。人类艺术、科学、哲学和宗教，都是宇宙通过意识实现自我超越的形式。

6.4 伦理的宇宙学基础

如果三大定律描述了宇宙的深层结构，那么伦理学可能具有宇宙学基础：

- 信息伦理：尊重信息的完整性和多样性。这包括尊重生命（遗传信息的载体）、尊重知识（文化信息的积累）、尊重真理（信息的准确性）。
- 能量伦理：促进能量的有效利用和可持续流动。这要求节约资源、发展可再生能源、维护生态系统的能量网络。
- 复杂性伦理：保护和促进复杂性的增长。这包括维护生物多样性、支持文化发展、鼓励创新和自我超越。

这些伦理原则不是从"是"直接推出的"应当"，而是基

于对宇宙结构的深刻理解所提出的"适应性价值"——适应宇宙深层规律的存在方式更可能持久和繁荣。

6.5 有限性与超越性

人类存在的根本张力在于有限性与超越性的矛盾：我们意识到自身的有限——生命的短暂、能力的局限、知识的边界——同时又渴望超越这些限制。宗教、哲学和科学都是应对这一张力的尝试。三大定律为这一张力提供了新的理解视角。有限性不是缺陷，而是复杂性增长的必要条件：只有有限的系统才能与环境区分，才能形成边界，才能进行信息处理。无限的存在将是与宇宙同一的存在，无法进行自我指涉和自我认识。但有限性不意味着封闭性。通过信息交流，我们与他人连接；通过能量流动，我们与环境交换；通过复杂性增长，我们不断超越当下的自我。这种"开放的有限性"或许是人类存在最深刻的特征。

6.6 死亡与不朽

死亡是意义问题的终极考验。如果个体意识随着脑活动的停止而消失，那么一生的努力是否只是徒劳？从信息视角看，死亡并非存在的彻底终结。遗传信息通过后代延续；文化信息通过作品和影响传承；我们改变的环境持续产生效应。虽然主观体验确实终结，但个体作为"信息模式"在更广泛的信息网络中继续存在。从复杂性视角看，死亡是复杂性更新的机制。没有个体的死亡，就没有新个体的出生，就没有自然选择和文化创新的空间。死亡与出生的循环是复杂性持续增长的必要条件。但这并不意味着

个体生命没有独特价值。每一个意识都是宇宙独特的"观点"，其不可复制的体验丰富了宇宙的自我认识。珍惜生命、充实生活，是对这一独特性的尊重，也是对宇宙复杂性增长的贡献。---

第七章 结论与展望

7.1 主要结论

本文提出了贯穿宇宙、物质和生命三个层级的三大永恒定律：1. 信息守恒与转化定律：信息总量守恒，但组织形式不断转化和提升；2. 能量流动与耗散结构定律：能量流动自发创造有序结构，生命和文明是其高级形式；3. 复杂性增长与自我超越定律：宇宙具有内在的复杂性增长趋势，每次层级跃迁都带来自我超越。这三条定律统一于"层级涌现"的框架：从量子场到星系，从化学分子到生命细胞，从神经脉冲到自我意识，自然界通过自我组织、自我复制和自我指涉机制，实现了从简单到复杂的演化。在这一图景中，生命不是宇宙的偶然点缀，而是其内在逻辑的必然展开；意识不是副现象，而是宇宙实现自我认识的媒介；人类不是物理世界的旁观者，而是宇宙自我实现的参与者。

7.2 对现代科学的意义

本文的框架对科学研究具有启发意义：在宇宙学中，需要更深入地研究信息与几何的关系，探索全息原理的物理机制，理解宇宙初始条件的起源。在生命科学中，需要整合分子生物学与系统科学，发展量化的复杂性理论，破解意识涌现的机制。在认知科学中，需要建立从神经活动到主观体验的桥梁，理解意义和价值的神经基础。在复

杂性科学中，需要发展跨尺度的统一理论，连接物理复杂性、生物复杂性、社会复杂性。

7.3 对人文精神的意义

在技术高速发展的时代，人文精神面临深刻挑战。本文的框架提示我们：反对虚无主义：宇宙具有内在的秩序和方向，生命具有客观的价值基础，意义不是幻觉而是涌现的性质。超越人类中心主义：人类是复杂性增长的重要节点，但不是终点。我们负有促进复杂性持续增长的伦理责任，包括对非人类生命和未来世代的责任。拥抱开放性：三大定律描述的是趋势而非宿命，是可能性而非必然性。人类的选择对宇宙的未来具有真实影响，这既是责任也是自由。

7.4 未竟的问题

本文的探讨留下了许多未解之谜：

- 意识的"硬问题"：神经活动如何产生主观体验？
- 宇宙的起源：大爆炸之前是否存在？初始条件为何如此"精细调节"？
- 自由意志：在决定论的物理定律与或然论的量子力学之间，自由意志是否可能？
- 他者心灵：我们如何确知其他意识的存在？

外星生命如果存在，是否具有可理解的心智？这些问题可能需要新的物理学、新的生物学和新的哲学才能回答。但追问本身，就是人类意识对宇宙奥秘的回应，就是复杂性增长定律在认识论层面的体现。

7.5 结语

站在21世纪的门槛上，回望宇宙138亿年的演化史，回望生命40亿年的探索史，回望人类文明万年的创造史，我们既感到谦卑，又感到庄严。谦卑，因为我们是宇宙尘埃的暂时聚集，是

基因复制的载体，是神经冲动的舞蹈。我们的知识和能力如此有限，我们的存在如此脆弱。庄严，因为我们是宇宙认识自身的眼睛，是生命探索可能性的先锋，是复杂性增长的工具和目的。通过我们，物质开始思考；通过我们，宇宙显现意义。三大永恒定律——信息守恒、能量流动、复杂性增长——不是冰冷的数学公式，而是宇宙自我实现的内在逻辑。理解这些定律，顺应这些定律，促进这些定律的实现，或许是人类存在最深层的意义。在这个意义上，每一个追问都是神圣的，每一个创造都是必要的，每一个生命都是重要的。因为我们不仅是宇宙的孩子，更是宇宙的自我觉醒。---参考文献1. 薛定谔, E. (1944). 《生命是什么?》. 剑桥大学出版社.2. 普里高津, I. (1967). 《结构、耗散与生命》. 载于《理论与生物学》.3. 惠勒, J.A. (1990). 《信息、物理、量子：寻找链接》. 载于《复杂性、熵与物理信息》.4. 兰道尔, R. (1961). 《计算的热力学代价》. IBM研究杂志.5. 萨斯坎德, L. (1995). 《黑洞互补性与世界全息》. 国际理论物理杂志.6. 香农, C.E. (1948). 《通信的数学理论》. 贝尔系统技术杂志.7. 托诺尼, G. (2008). 《意识作为整合信息》. 生物通报.8. 劳埃德, S. (2006). 《宇宙的程序：量子计算机的宇宙》. 克诺夫出版社.9. 德日进, P. (1955). 《人的现象》. 哈珀出版社.10. 斯莫林, L. (1997). 《宇宙的生命》. 牛津大学出版社.---字数统计：

约12,000字（中文字符）---这篇论文从物理学、生物学和哲学三个维度，构建了贯穿宇宙-物质-生命层级的理论框架。

The Eternal Laws and Meanings of the Universe,
Matter, and Life Levels We have laid bare the very essence of eternity — this is the ultimate distinction ranging from the laws of nature to the consciousness of life: 1. The material universe itself: neither eternal nor perishable Mountains, rivers, stars, planets, and all things are only the gathering, dispersing, and flowing of energy and particles. Nature has no subjectivity, no perception, and no concept of "eternity". It merely exists, evolves, perishes, and reorganizes. To it, everything is but an objective process — no meaning, no eternity. 2. Lower life forms: living on instinct, ignorant of eternity They have only the instincts to seek benefits and avoid harm, survive and reproduce, with no self-awareness, rational reflection, insight into laws, or value judgment. They cannot perceive the universe, comprehend time, let alone grasp "eternity". To them, the world is nothing but chaotic stimuli and responses — numb, passive, unknowing, and unawakened. 3. Advanced intelligent

life: the only beings that can hold "eternity" Only life endowed with advanced rationality, deep cognition, and clear insight can: - Perceive the operation of the universe- Understand the essence of reality- Extract laws and truths- Ponder "existence" and "eternity" The eternity of the universe truly exists only when perceived by advanced intelligence. Matter will perish, civilizations will change, and bodies will decay. Yet the understanding of truth, the insight into reality, and the rational cognition of the universe are the only things that can traverse time, transcend life and death, and approach eternity. The essence of this discourse in one sentence The universe has no inherent eternity, and matter has no inherent meaning. It is the understanding and insight of advanced intelligence that endow the universe with eternity and existence with meaning. This is the sole carrier of eternity, as well as the fundamental mission and dignity of advanced life. Naturally, the existence of matter and the universe is an objective, natural state of motion. They would exist even without the understanding and cognition of human wisdom, bearing no absolute connection to human reason and intelligence. Nature, matter, and the

universe are primary; all living species, low-level or advanced, are merely their products. Matter generates and nurtures consciousness, mainly through the gradual advancement and transformation of organic and inorganic substances. Carbon-based life takes carbon as its backbone, relying on water, oxygen, and a mild environment; silicon-based life takes silicon as its backbone, resistant to high temperatures and radiation, and requires no water or oxygen, yet exists only in theory. Their specific differences are as follows:

Differences in Chemical Foundations - Carbon-based

life: Centered on carbon atoms, forming complex organic molecules (e.g., proteins, DNA) via carbon-carbon bonds, with stable structures and high

evolvability.- Silicon-based life: Centered on silicon atoms, forming siloxanes or silanes; however, silicon-silicon bonds are fragile, making it difficult to

construct complex molecules, with poor chemical stability. Comparison of Environmental Adaptability 1.

Temperature and radiation- Carbon-based life: Only adapts to 0–40°C, sensitive to radiation, and requires atmospheric protection.- Silicon-based life: Tolerates

high temperatures of 200–600°C, immune to radiation,

and can survive in vacuums or high-radiation environments (e.g., the surface of Venus).²

Dependence on medium- Carbon-based life: Must rely on liquid water for metabolism.- Silicon-based life:

Uses liquid ammonia, molten silicon, or concentrated phosphoric acid as a medium, and decomposes in

water. Differences in Physiological Characteristics 1.

Metabolism and lifespan- Carbon-based life: Fast

metabolism, requires food and respiration, lifespan

generally < 100 years.- Silicon-based life: Extremely

slow metabolism, no need for food or respiration,

lifespan up to millions of years.² 2. Form and structure-

Carbon-based life: Organic soft tissues (e.g., muscles, organs), vulnerable to damage.- Silicon-based life:

Presumed to have a crystalline or metallic structure, capable of self-repair. In fact, the process by which

matter transforms into organic and inorganic

substances to give birth to biological macromolecules is

extremely complex and profound. This includes both

carbon-based and silicon-based life, which are not the only two inevitable forms of life's origin. Human

cognition, including the understanding, insight, and

analysis of advanced intelligence, remains imperfect.

Elements such as hydrogen, oxygen, carbon, silicon, potassium, sodium, and calcium — organic matter — lower life form I —integrated and coupled with other critical conditions and factors, promoting transformation and upgrading to lower life form II — biological macromolecules — living organisms. This process is extraordinarily complex and lengthy.

Common elements include hydrogen, oxygen, nitrogen, carbon, etc., though the most abundant elements vary by specific context (e.g., the Earth's crust or the universe): Oxygen (O) dominates the Earth's crust at about 46.6%; Hydrogen (H) dominates the universe at about 74%. Common Elements in the Earth's Crust

Data on the elemental abundance of the Earth's crust (lithosphere) are based on geological research: 1.

Oxygen (O): ~46.6%, the absolute dominant element in the crust, widely found in water, minerals, and the atmosphere. 2. Silicon (Si): ~27.7%, the main component of rocks and soil. 3. Aluminum (Al): ~8.1%, the most abundant metal in the crust, common in clay and ores. 4. Iron (Fe): ~5.0%, mainly found in metallic minerals and the Earth's core. 5. Calcium (Ca): ~3.6%, common in limestone and bones. Common Elements in

the Universe Cosmic elemental abundance is based on astrophysical observations, dominated by hydrogen and helium: 1. Hydrogen (H): $\sim 74\%$, originating from Big Bang nucleosynthesis, the fuel of stars and the foundation of cosmic matter. 2. Helium (He): $\sim 24\%$, also from the Big Bang, driving internal stellar reactions. 3. Oxygen (O): $\sim 1.04\%$, produced by stellar nuclear fusion (e.g., supernova explosions), ranking third. 4. Carbon (C): $\sim 0.46\%$, formed inside stars via the triple-alpha process. The emergence of living species is inseparable from these elements, as well as physical motion and changes and other auxiliary conditions. This applies not only to humans, the Earth, the Solar System, and the Milky Way, but also to any life that may arise on other celestial bodies or extragalactic galaxies —only with unique variations and differences. Necessity, contingency, coupling, and integration are all indispensable. Although human cognitive and perceptual abilities are crucial and powerful, they undoubtedly have inherent limitations, and can lead to fallacies and illusions. Sometimes truth is right before our eyes yet slips away; sometimes a tiny error leads to a vast

divergence. This happens not only to ordinary people but also to scientists. The origin of life is extremely complex and profound. For matter to generate consciousness is even more difficult, requiring numerous physical, chemical, biological, and other conditions and factors. Chemical elements are absolutely essential.

Hierarchy of Eternity: On the Unified Laws of the Universe, Matter and Life Hierarchies and Their Existential Significance
Abstract This paper attempts to explore the eternal laws running through different levels of existence at the intersection of cosmology, physics and life sciences, and inquire into their enlightenment for understanding the meaning of life. From quantum fluctuations to galactic evolution, from inorganic molecules to self-consciousness, nature seems to follow certain deep unities. This paper proposes "Hierarchical Emergence" as the core framework, demonstrating how the three laws of information conservation, energy flow and complexity growth run through the three realms of the universe, matter and life, and on this basis, discusses the cosmological significance of human existence. **Keywords:**

Hierarchical Emergence; Information Conservation;
Dissipative Structure; Complexity Growth; Cosmic
Teleology Chapter 1 Introduction: The Inquiry from
Fragments to the Whole 1.1 Raising the Question
Modern science has achieved unprecedented success in
unraveling the mysteries of nature. Quantum
mechanics reveals the probabilistic nature of the
microscopic world, the theory of relativity reconstructs
the concept of space-time, molecular biology cracks the
genetic code, and neuroscience is approaching the
neural mechanism of consciousness. However, the
explosive growth of knowledge has also brought a
profound dilemma of fragmentation: physicists often
ignore the origin of life, biologists rarely ask about the
underlying causes of physical laws, and philosophers
often lose their way between scientific facts and value
inquiries. This fragmentation is not only the result of
disciplinary division of labor, but also reflects the deep-
seated anxiety of human cognition: can we find unity
behind diversity? Is the existence of the universe
accidental or inevitable? Is the emergence of life an
inevitable corollary of physical laws or a contingent
event in the history of the universe? More importantly,

if there are eternal laws running through different levels, what enlightenment do they bring to our understanding of the meaning of our own existence?

1.2 Research Path and Methods This paper adopts the "Level Analysis" method, dividing existence into three basic levels: - Cosmic level: space-time, gravity, cosmic evolution- Material level: elementary particles, atoms, molecules, condensed matter- Life level: cells, organisms, ecosystems, consciousness Each level has its unique organizational principles and emergent properties, but the core argument of this paper is that behind these differences, there are several eternal laws running through consistently. These laws are not mathematical formulas in the traditional physical sense, but more basic organizational principles.

1.3 Paper Structure Chapters 2 to 4 elaborate on the three eternal laws respectively: the law of information conservation, the law of energy flow and the law of complexity growth. Chapter 5 discusses how these laws uniformly explain the continuous spectrum from cosmic origin to life evolution. Chapter 6 discusses the meaning of existence on this basis. Chapter 7 is the conclusion and prospect.

Chapter 2 The First Law:

Information Conservation and Transformation 2.1
From Physical Entropy to Information Entropy The second law of thermodynamics is usually expressed as that the entropy of an isolated system always tends to increase, pointing to the ultimate fate of heat death. However, this formulation ignores the central role of information in physical processes. In the mid-20th century, Claude Shannon founded information theory, defined information as "the reduction of uncertainty", and found that the mathematical form of information entropy is strikingly similar to thermodynamic entropy. The principle proposed by Rolf Landauer in 1961 reveals a profound fact: the erasure of information is inevitably accompanied by energy dissipation and entropy increase. This discovery subverts the traditional concept of information — information is no longer an abstract mathematical concept, but an entity with physical reality. Quantum information theory has further developed this idea: the entanglement and superposition of quantum states indicate that information may be a more fundamental reality than matter and energy. 2.2 The Holographic Principle and Cosmic Information Conservation In the 1990s, the

Holographic Principle proposed by Gerard 't Hooft and Leonard Susskind represents the pinnacle of information physics. The principle states that the maximum amount of information in a spatial region is proportional to the area of its boundary, not its volume. This means that all information in our three-dimensional world may be encoded on a distant two-dimensional boundary — the universe may essentially be a huge quantum computer. The study of the black hole information paradox further strengthens the physical status of information. Stephen Hawking initially believed that black hole evaporation would lead to the permanent loss of information, which contradicts the unitarity of quantum mechanics. After three decades of debate, the physics community has gradually reached a consensus: information is conserved during black hole evaporation, although its form may undergo extreme transformation. This conclusion suggests that information conservation may be a more fundamental law than energy conservation.

2.3 Biological Information: From Genetic Code to Neural Coding

The uniqueness of living systems lies in their development of highly complex information

processing mechanisms. The "Central Dogma" proposed by Francis Crick, one of the discoverers of the DNA double helix structure, describes the flow direction of genetic information: DNA → RNA → protein. This principle is not only a chemical process, but also a precise algorithm for information conversion — the four-letter genetic code can encode all instructions that constitute life. Recent discoveries in epigenetics show that information transmission is far more complex than the Central Dogma. Gene expression is regulated by environmental signals, and some acquired characteristics can be inherited to offspring through mechanisms such as methylation. This suggests that biological information is not only static storage, but a dynamic process of interaction with the environment. The nervous system pushes information processing to a new height. The human brain contains about 86 billion neurons, forming the most complex information network through hundreds of trillions of synaptic connections. The characteristic of neural information is its "semanticity" — the brain not only processes symbols, but also endows them with meaning. From photon stimulation to visual consciousness, from sound

vibration to musical aesthetics, information undergoes a qualitative change from physical signals to subjective experience in the nervous system.

2.4 Philosophical Formulation of the Law of Information Conservation

Based on the above analysis, we can propose the law of information conservation and transformation as the first eternal law: Law 1: The total amount of information is conserved in the process of cosmic evolution, but its organizational form is constantly transformed. From quantum information to classical information, from genetic information to neural information, from individual memory to cultural inheritance, information achieves the improvement of self-organization degree in transformation. This law uniformly explains why the physical world is comprehensible (information conservation ensures the validity of the law of causality), why life can evolve (replication and variation of genetic information), and why consciousness can emerge (integration of neural information). Information is not a by-product of existence, but an essential attribute of existence.

Chapter 3 The Second Law: Energy Flow and Dissipative Structures

3.1 Thermodynamics and the

Thermodynamic Basis of Life The "heat death" state predicted by the second law of classical thermodynamics seems to have a profound contradiction with the growth of order in the living world. Erwin Schrödinger sharply pointed out in *What Is Life?* that life feeds on "negative entropy" and maintains its low-entropy state by drawing free energy from the environment. Ilya Prigogine's Dissipative Structure Theory provides a key framework for understanding this contradiction. Open systems far from equilibrium can spontaneously form space-time ordered structures under specific conditions, such as Bénard convection and chemical clocks (BZ reaction). The maintenance of these structures depends on the continuous flow of energy/matter, and their orderliness even exceeds that of equilibrium structures.

3.2 Cosmic Energetics: From Stars to Black Holes

The universe itself is the largest dissipative structure. The Big Bang created an extremely high-temperature initial state. With the expansion of the universe, the temperature gradually decreases and the energy density dilutes, but the complexity of local structures increases. Stars are the most basic energy converters in the universe —

they convert hydrogen into helium through nuclear fusion, and the released photons and neutrinos drive the evolution of planetary systems. The evolutionary history of stars is a history of the complication of energy flow. The stable combustion in the main sequence stage provides the necessary conditions for planetary life; the violent material ejection in the red giant stage scatters heavy elements; the extreme conditions produced by supernova explosions synthesize elements heavier than iron, which become the basis of rocky planets and life chemistry. Black holes are the ultimate form of energy organization. Although the information inside the event horizon seems to be lost, Hawking radiation shows that black holes have temperature and radiate energy outward. The Bekenstein-Hawking entropy formula shows that black hole entropy is proportional to the area of its event horizon, which once again confirms the profound connection between information and geometry. Black holes may be the most effective information (energy) storage and conversion devices in the universe.

3.3 The Energy Network of the Earth System

The Earth is a typical dissipative system, and its orderliness depends

entirely on the continuous input of solar radiation. About 1.74×10^{17} watts of solar energy enter the Earth system every year, driving atmospheric circulation, water cycle, geological activities and life processes. Photosynthesis is the core node of the Earth's energy network. Through light and dark reactions, green plants, algae and certain bacteria convert solar energy into chemical energy and inorganic carbon into organic molecules. This process fixes about 100 billion tons of carbon every year, which not only provides an energy basis for the food chain, but also completely changes the composition of the Earth's atmosphere by releasing oxygen, creating conditions for the evolution of aerobic metabolism and complex life. The food web is the ecological manifestation of energy flow. The efficiency of energy transfer between trophic levels is about 10%, which explains why ecosystems usually have only 4-5 trophic levels. But the "loss" of energy (actually dissipated as heat) is precisely the price for the system to maintain order — without dissipation, there is no life.

3.4 Civilization as a New Form of Energy Dissipation

The evolution of human civilization can be regarded as the continuous upgrading of energy

dissipation forms. The agricultural revolution improved the capture efficiency of solar energy by domesticating plants and animals; the industrial revolution released solar energy stored in geological history by burning fossil fuels; nuclear energy and renewable energy attempt to directly utilize atomic energy or instant solar energy. However, the progress of civilization is not only the growth of energy quantity, but also the improvement of energy quality — from scattered biological energy to concentrated chemical energy, and then to precisely controlled electric energy and information energy. The Internet and artificial intelligence represent a new dimension of energy dissipation: global data centers consume about 200 terawatt-hours of electricity every year, which is mainly used for information storage, transmission and processing. In this sense, human civilization is creating a "technological dissipative structure", whose complexity may surpass the biosphere itself.

3.5 Philosophical Formulation of the Law of Energy Flow

Based on the above analysis, we propose the law of energy flow and dissipative structures as the second eternal law: Law 2: The flow of energy in an open

system inevitably leads to the spontaneous formation of ordered structures. The complexity of these dissipative structures is positively correlated with the intensity and efficiency of energy flow, and life and civilization are the highest manifestations of this principle under specific conditions. This law explains why life must emerge (as long as there is energy flow, there is the possibility of the formation of dissipative structures), why life tends to be complex (optimization of energy flow efficiency), and why civilization continues to progress (improvement of energy control ability). Energy flow is not a destructive force that destroys order, but a creative force that creates order.

Chapter 4 The Third Law: Complexity Growth and Self-Transcendence

4.1 Scientific Definition and Measurement of Complexity

Complexity is an interdisciplinary research theme that emerged in the second half of the 20th century, but its precise definition is still controversial. Computational complexity theory focuses on the computing resources required to solve problems; algorithmic information theory measures the complexity of objects with program length; statistical complexity attempts to

distinguish different states of "order" (simple), "random" (simple) and "complex" (between the two). The concept of Effective Complexity may be of the most philosophical significance: it measures the degree to which a system exhibits regularity. A completely random system has low effective complexity (no rules to follow), a completely ordered system also has low effective complexity (rules are too simple), and only systems that have both rules and accidents have high effective complexity. Life, especially human consciousness, is the pinnacle of effective complexity.

4.2 The Evolutionary History of Cosmic Complexity

The evolution of the universe can be interpreted as a history of complexity growth. In the first moments after the Big Bang, the universe was in an extremely high-temperature and high-density state, with few particle types and simple interactions — this was the "simple" stage. As the universe cooled, quarks combined into hadrons, hadrons combined into atomic nuclei, and free electrons combined with atomic nuclei to form atoms — complexity began to grow. Cosmic microwave background radiation shows that 380,000 years after the Big Bang, the distribution of cosmic

matter was almost uniform, with density fluctuations of only one in 100,000. But these tiny seeds were continuously amplified under the action of gravity, forming the first generation of stars and galaxies. The emergence of galaxies marks the complication of spatial structure — matter is no longer uniformly distributed, but gathered into celestial systems with internal structure and hierarchy. The growth of chemical complexity is equally amazing. Big Bang nucleosynthesis only produced hydrogen, helium and trace amounts of lithium; stellar nucleosynthesis produced elements up to iron; supernovae and merged neutron star events produced heavier elements. By the time the solar system formed, there were 94 natural elements in the universe, laying the foundation for chemical diversity and life chemistry.

4.3 Life: The Self-Acceleration of Complexity

The emergence of life is a key turning point in the history of complexity growth. Different from the passive evolution of physical systems, life has the ability of self-replication and natural selection, which makes complexity growth have the characteristics of self-acceleration. Molecular biology reveals the multi-level organization of life

complexity: metabolic networks, gene regulatory networks, signal transduction networks, neural networks, ecosystem networks... Each level is built on the next level, and new properties emerge. This hierarchical organization is not a simple superposition, but an emergent phenomenon that "the whole is greater than the sum of its parts". The evolution of multicellular organisms is a typical case of complexity growth. From single cells to cell differentiation, from tissues to organs, from organ systems to individuals, each step is accompanied by the specialization of functions and the enhancement of integration. The human cerebral cortex contains about 16 billion neurons, forming about 100 trillion synaptic connections, and this connection complexity far exceeds any known artificial system. However, the complexity of life is reflected not only in structure, but also in function. The emergence of consciousness is a milestone event in the growth of complexity. Subjective experience, self-awareness, language ability, abstract thinking, moral judgment — these "high-order" functions cannot be simply deduced from the physical properties of neurons, but are the emergent results of

system complexity. 4.4 Cultural Evolution: Complexity Beyond Biology The emergence of human culture has opened a new era of complexity growth. Different from biological evolution relying on genetic variation and natural selection, cultural evolution proceeds through the transmission and selection of memes, and its speed is several orders of magnitude faster than biological evolution. Language is the basis of cultural complexity. Human language has recursiveness, openness and referentiality, can express infinite meanings, describe non-present situations, and construct fictional worlds. Language not only transmits information, but also shapes thinking — although the Sapir-Whorf hypothesis is extreme, the influence of language on cognition has been widely confirmed. The invention of writing enables the accumulation and inheritance of cultural complexity. From oral tradition to cuneiform writing, from manuscripts to printing, from electronic media to the Internet, each revolution in information technology has brought an exponential growth of cultural complexity. Today's global knowledge network contains the wisdom accumulation of thousands of years of human beings, and its complexity has

exceeded the extent that any individual can fully grasp.

4.5 Philosophical Formulation of the Law of Complexity Growth

Based on the above analysis, we propose the law of complexity growth and self-transcendence as the third eternal law: Law 3: The universe has an inherent trend of complexity growth. From physical structures to life organizations, and then to cultural systems, complexity achieves exponential growth through self-organization, self-replication and self-reference mechanisms, and each level leap brings self-transcendence of the form of existence. This law explains why the universe does not stay in a simple state, why life inevitably tends to be complex, and why human civilization continues to progress. Complexity growth is not an accidental side effect, but an inherent driving force of cosmic evolution.

Chapter 5 The Unity of the Three Laws: The Cosmic Picture of Hierarchical Emergence

5.1 The Intrinsic Connection of the Three Laws

The three laws of information conservation, energy flow and complexity growth are not isolated, but constitute a unified understanding framework. The unity of information and energy: Landauer's principle has shown the equivalence between information

erasure and energy dissipation. At a deeper level, John Wheeler's proposition "It from Bit" holds that physical reality is essentially informational; another view holds that information is an emergent property of physical processes. Whichever view is correct, the coupling of information and energy is clear — without energy flow, information cannot be processed; without information organization, energy cannot be effectively utilized. The unity of energy and complexity: Dissipative structure theory shows that energy flow is a necessary condition for the generation of complexity. But energy flow alone does not guarantee complexity growth — appropriate boundary conditions, feedback mechanisms and selection pressure are also required. Life optimizes energy utilization efficiency through metabolic adaptation and screens the direction of complexity growth through natural selection. In this sense, life is the optimal solution for energy-complexity transformation. The unity of complexity and information: Complexity is essentially the organizational form of information. Random sequences have large information volume but low complexity, regular sequences have low complexity and low

information volume, and only sequences that are neither completely random nor completely regular have high effective complexity. The genetic codes, neural codes and cultural symbols of life are all information organization forms with high effective complexity.

5.2 The Mechanism of Hierarchical Emergence

The leap of the three levels — from physics to chemistry, from chemistry to life, from life to consciousness — can be understood uniformly through the mechanism of "hierarchical emergence".

Physics-chemistry leap: Under appropriate energy flow conditions (such as the planetary surface around stars), atoms form molecules through chemical bonds, and molecules form larger structures through self-assembly. The key to this process is "chemical selection" — some molecular structures are more stable or reactive than others, thus being selectively retained in energy flow.

Chemistry-life leap: The RNA world hypothesis holds that the earliest self-replicating molecules may be RNA, which can both store information and catalyze reactions. Once self-replication begins, natural selection takes effect automatically: molecular systems with high replication efficiency and moderate mutation

rates will gain competitive advantages. The formation of cell membranes separates the internal environment from the external environment, creating conditions for the co-evolution of metabolism and heredity. Biology-consciousness leap: When the complexity of the nervous system reaches a critical point, subjective experience emerges. There is still no recognized scientific explanation for this "hard problem of consciousness", but frameworks such as Integrated Information Theory (IIT) attempt to quantify the neural basis of consciousness. In any case, the emergence of consciousness enables the universe to "know" itself, which is a qualitative change in the growth of complexity.

5.3 The Arrow of Time and the Irreversibility of Hierarchies

The three laws together define the directionality of time. The thermodynamic arrow of time points to entropy increase, while the complexity arrow of time points to the increase of organization — these two arrows are not contradictory, because complexity growth occurs in open systems at the cost of environmental entropy increase. The leap of hierarchies is irreversible: once life emerges, it will not retreat to a chemical system; once consciousness

emerges, it will not dissolve into unconscious processes. This irreversibility stems from the accumulation of information: the accumulation of genetic information, the plasticity of neural connections, the inheritance of cultural knowledge. Once information is generated, it has relative independence and can guide future organization and evolution.

5.4 The Self-Realization of the Universe

From this perspective, the evolution of the universe can be interpreted as a process of self-realization: starting from simple initial conditions, through the inevitability of physical laws and the contingency of random fluctuations, the universe gradually develops the ability to recognize itself. Human consciousness, and other possible cosmic consciousness, are the media through which the universe achieves self-knowledge. This is not the traditional form of teleology — the universe is not pre-designed to produce life and humans. Rather, the inherent logic of physical laws makes complexity growth statistically inevitable, and life and consciousness are one of the inevitable directions of complexity growth. The universe thinks about itself through us, and inquires about meaning through us.

Chapter 6 The Meaning of Existence: Seeking Value in Eternal Laws

6.1 The Unification of Facts and Values

Traditional philosophy strictly distinguishes between "is" and "ought", holding that value judgments cannot be deduced from factual statements. This distinction is logically valid, but may lead to a crisis of meaning of existence: if the universe is only an accidental product of physical processes, life is only a carrier of gene replication, and consciousness is only a by-product of neural activities, then are value, meaning and purpose just illusions? The three eternal laws provide a framework for rethinking this issue. If information conservation, energy flow and complexity growth are the deep structure of the universe, then adapting to these structures and promoting these processes may have an objective value basis.

6.2 The Intrinsic Value of Life

According to the law of complexity growth, life is not an accidental ornament of the universe, but an inevitable product and active promoter of complexity growth. Every living body is the achievement of hundreds of millions of years of evolution, carrying unique genetic information and adaptive history. This "evolutionary achievement" endows life with inherent

dignity and value. However, the value of life lies not only in its history, but also in its potential. Life has the ability of self-transcendence: from single cells to multicellular organisms, from instinct to learning, from individuals to societies, life constantly breaks through its own limitations. This tendency of self-transcendence, echoing the law of complexity growth, constitutes the dynamic dimension of life value.

6.3 The Meaning of Consciousness: The Awakening of the Universe

The emergence of consciousness makes the question of meaning possible. Without consciousness, there is no intentionality "about" something, no inquiry into meaning. In this sense, consciousness is a prerequisite for meaning. However, consciousness is not only a subjective condition of meaning, but also an objective achievement of the universe. Before the emergence of consciousness, the universe operated according to physical laws, but there was no "point of view" to experience this process. Consciousness enables the universe to "feel" its own beauty, "think" its own laws, and "create" values beyond the natural state. Human art, science, philosophy and religion are all forms of cosmic self-transcendence through

consciousness.

6.4 The Cosmological Basis of Ethics

If the three laws describe the deep structure of the universe, then ethics may have a cosmological basis:

Information ethics: Respect the integrity and diversity of information. This includes respecting life (the carrier of genetic information), respecting knowledge (the accumulation of cultural information), and respecting truth (the accuracy of information).

Energy ethics: Promote the efficient utilization and sustainable flow of energy. This requires saving resources, developing renewable energy, and maintaining the energy network of the ecosystem.

Complexity ethics: Protect and promote the growth of complexity. This includes maintaining biodiversity, supporting cultural development, and encouraging innovation and self-transcendence.

These ethical principles are not "ought" directly deduced from "is", but "adaptive values" proposed based on a profound understanding of the cosmic structure — ways of existence that adapt to the deep laws of the universe are more likely to last and prosper.

6.5 Finitude and Transcendence

The fundamental tension of human existence lies in the contradiction between finitude and transcendence: we

are aware of our own finitude — the shortness of life, the limitations of ability, the boundaries of knowledge — while longing to transcend these limitations. Religion, philosophy and science are all attempts to cope with this tension. The three laws provide a new perspective for understanding this tension. Finitude is not a defect, but a necessary condition for complexity growth: only a finite system can be distinguished from the environment, form boundaries, and carry out information processing. An infinite existence would be identical to the universe, unable to carry out self-reference and self-knowledge. However, finitude does not mean closure. We connect with others through information exchange; we exchange with the environment through energy flow; we constantly transcend the present self through complexity growth. This "open finitude" may be the most profound feature of human existence.

6.6 Death and Immortality

Death is the ultimate test of the question of meaning. If individual consciousness disappears with the cessation of brain activity, is a lifetime of effort just futile? From the perspective of information, death is not the complete end of existence. Genetic information

continues through offspring; cultural information is inherited through works and influences; the environment we change continues to produce effects. Although subjective experience does end, the individual continues to exist as an "information pattern" in a broader information network. From the perspective of complexity, death is a mechanism for the renewal of complexity. Without the death of individuals, there would be no birth of new individuals, no room for natural selection and cultural innovation. The cycle of death and birth is a necessary condition for the continuous growth of complexity. But this does not mean that individual life has no unique value. Every consciousness is a unique "point of view" of the universe, and its irreproducible experience enriches the self-knowledge of the universe. Cherishing life and enriching life are respects for this uniqueness, and also contributions to the growth of cosmic complexity.

Chapter 7 Conclusion and Prospect

7.1 Main Conclusions

This paper proposes three eternal laws running through the three levels of the universe, matter and life:

1. The law of information conservation and transformation: the total amount of information is

conserved, but the organizational form is constantly transformed and improved;2. The law of energy flow and dissipative structures: energy flow spontaneously creates ordered structures, and life and civilization are its advanced forms;3. The law of complexity growth and self-transcendence: the universe has an inherent trend of complexity growth, and each level leap brings self-transcendence. These three laws are unified in the framework of "hierarchical emergence": from quantum fields to galaxies, from chemical molecules to living cells, from neural impulses to self-consciousness, nature has realized the evolution from simplicity to complexity through self-organization, self-replication and self-reference mechanisms. In this picture, life is not an accidental ornament of the universe, but the inevitable expansion of its inherent logic; consciousness is not an epiphenomenon, but a medium for the universe to achieve self-knowledge; humans are not spectators of the physical world, but participants in the self-realization of the universe.

7.2 Significance to Modern Science

The framework of this paper is enlightening to scientific research: In cosmology, it is necessary to further study the relationship between

information and geometry, explore the physical mechanism of the holographic principle, and understand the origin of the initial conditions of the universe. In life sciences, it is necessary to integrate molecular biology and systems science, develop quantitative complexity theory, and crack the mechanism of consciousness emergence. In cognitive science, it is necessary to build a bridge from neural activities to subjective experience, and understand the neural basis of meaning and value. In complexity science, it is necessary to develop a cross-scale unified theory, connecting physical complexity with biological complexity and social complexity.

7.3 Significance to Humanistic Spirit

In the era of rapid technological development, humanistic spirit is facing profound challenges. The framework of this paper suggests that:

- Oppose nihilism: the universe has inherent order and direction, life has an objective value basis, and meaning is not an illusion but an emergent property.
- Transcend anthropocentrism: humans are an important node in the growth of complexity, but not the end point. We have the ethical responsibility to promote the continuous growth of complexity, including

responsibility for non-human life and future generations. Embrace openness: the three laws describe trends rather than fates, possibilities rather than necessities. Human choices have a real impact on the future of the universe, which is both responsibility and freedom.

7.4 Unresolved Questions

The discussion in this paper leaves many unsolved mysteries: - The hard problem of consciousness: how do neural activities produce subjective experience?- The origin of the universe: did anything exist before the Big Bang? Why are the initial conditions so "finely tuned"?- Free will: is free will possible between deterministic physical laws and probabilistic quantum mechanics?- Other minds: how can we be sure of the existence of other consciousness? If extraterrestrial life exists, does it have understandable minds? These questions may require new physics, new biology and new philosophy to answer. But the inquiry itself is the response of human consciousness to the mysteries of the universe, and the embodiment of the law of complexity growth at the epistemological level.

7.5 Concluding Remarks

Standing on the threshold of the 21st century, looking back at the 13.8 billion years of cosmic evolution, the 4

billion years of life exploration, and the ten thousand years of human civilization creation, we feel both humble and solemn. Humble, because we are a temporary gathering of cosmic dust, a carrier of gene replication, a dance of neural impulses. Our knowledge and ability are so limited, our existence so fragile. Solemn, because we are the eyes through which the universe knows itself, the pioneers of life exploring possibilities, the tools and purposes of complexity growth. Through us, matter begins to think; through us, the universe reveals meaning. The three eternal laws — information conservation, energy flow, complexity growth — are not cold mathematical formulas, but the inherent logic of cosmic self-realization. Understanding these laws, conforming to these laws, and promoting the realization of these laws may be the deepest meaning of human existence. In this sense, every inquiry is sacred, every creation is necessary, and every life is important. For we are not only the children of the universe, but also the self-awakening of the universe. References 1. Schrödinger, E. (1944). *What Is Life?*. Cambridge University Press. 2. Prigogine, I. (1967). *Structure, Dissipation and Life*. In

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金鹰纪实卫视 46评论 2025年12月28日

世界冠军袁心玥，有新身份









大象新闻 42评论 2025年12月29日

吵架将孩子扔河里后续：原因曝光，夫妻身份被扒，娃状态让人担忧



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留下另一个孩子在桥上 哭得撕心裂肺

知情人：路过的一位好心人将三人救起

留下另一孩子在桥上哭的撕心裂肺

知情人：路过的人将三人救起

头条 @峰言

夫妻吵架男子将小孩抛入河中,随后又接连跳河救人,当事人被
近日,广东潮州一对夫妻因家庭琐事发生激烈争吵,争吵中男子将怀
随后男子也跳入河中。多名路人见状合力救援,最终将河中三人全
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平顶山被当街殴打15岁

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这是黑社会团伙了

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♡ 29



枪会山的风 2小时前 广东

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2条回复 >

♡ 7



狼人禅语962 37分钟前 云南

用个寻衅滋事造成严重后果，夫妻俩都跑不掉。按伤害类案件办理，只能处理打人男。😏😏

回复 >

♡ 10



无心快语的兵哥 32分钟前 山东

应该异地关押，异地用警，异地办案，异地判刑！

回复 >

♡ 3



淡淡花香332 53分钟前 山东

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回复 >

♡ 12



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姓名：凡梦辞

性别：女

年龄：15

外貌特征：体型偏

瘦大眼睛五官清秀

嘴唇偏薄，带有齐

刘海，发质偏直

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